

Advanced PPA Reactor and Process Development

Design and development of a second generation Plasma Pyrolysis Assembly (PPA) reactor is currently underway as part of NASA's Atmosphere Revitalization Resource Recovery effort. By recovering up to 75% of the hydrogen currently lost as methane in the Sabatier reactor effluent, the PPA helps to minimize life support resupply costs for extended duration missions. To date, second generation PPA development has demonstrated significant technology advancements over the first generation device by doubling the methane processing rate while, at the same time, more than halving the required power. One development area of particular interest to NASA system engineers is fouling of the PPA reactor with carbonaceous products. As a mitigation plan, NASA MSFC has explored the feasibility of using an oxidative plasma based upon metabolic CO₂ to regenerate the reactor window and gas inlet ports. The results and implications of this testing are addressed along with the advanced PPA reactor development work.